

CLAIMS

1. Apparatus including:
 - a first component defining a first passage;
 - 5 a second component connectable with the first component and defining a second passage, said passages being aligned when the components are connected to each other;
 - a locking pin configured for being accommodated in the aligned passages thereby to prevent separation of the components, the pin being rotatable, when so
 - 10 accommodated, relative to the components, between
 - a locked position in which the pin engages at least one of the components to prevent withdrawal of the pin from the aligned passages, and
 - a free position in which the pin is slidably removable from the aligned passages to permit separation of the components.
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2. Apparatus according to claim 1 configured such that when the first component and second component are connected to each other, they can substantially only be separated by effecting relative movement of the components in opposite disengagement directions, and wherein the extending of the pin from the first passage
- 20 into the second passage prevents said relative movement in said disengagement directions.
3. Apparatus according to claim 2 configured such that the pin, when accommodated in said aligned passages, extends in a direction non-parallel to said
- 25 disengagement directions.
4. Apparatus according to claim 3 configured such that the pin, when accommodated in said aligned passages, extends in a direction substantially perpendicular to said disengagement directions.

5. Apparatus according to any one of claims 1 to 4 wherein one of said components includes a first formation, and the pin has a second formation configured for engagement with the first formation when the pin is in the locked position.
- 5 6. Apparatus according to claim 5 wherein the pin is of generally cylindrical shape and the second formation includes a pair of spaced walls at least partly defining a circumferentially extending slot in the pin, the pin being configured such that the first formation enters the slot as the pin is rotated from the free position to the locked position.
- 10 7. Apparatus according to claim 6 wherein the pin has an axis of rotation about which the pin rotates between the free and locked positions, the pin further having a surface which constitutes a floor of the slot, the floor having a first end, with successive positions along the floor away from the first end being disposed
- 15 successively further, radially, from said axis, the first formation being configured to engage and ride along said floor when the pin is rotated from the free position to the locked position.
8. Apparatus according to claim 7 wherein the floor has a second end opposite
- 20 the first end thereof, and defines a land area adjacent the second end for stably engaging the first formation when the pin is in the locked position.
9. Apparatus according to claim 8 wherein the land areas is substantially flat.
- 25 10. Apparatus according to claim 8 wherein the land areas is substantially concave.
11. Apparatus according to any one of claim 6 to 10 wherein the slot extends helically about the pin such that upon rotation of the pin from the free position to the
- 30 locked position, the first formation engages at least one of said walls to draw the pin further into said aligned passages, and upon rotation of the pin from the locked

position to the free position the first formation engages at least one of said walls to force the pin partly out of said aligned passages.

12. Apparatus according to any one of claims 5 to 11 wherein the pin has therein
5 an insertion recess extending, longitudinally relative to the pin, to at least a first end of the pin, the insertion recess being configured to accommodate the first formation to permit insertion of the pin into said aligned passages when the insertion recess is aligned with said first formation.
- 10 13. Apparatus according to claim 12 wherein the insertion recess extends to the first end of the pin but terminates at a position spaced from an opposite, second end of the pin.
14. Apparatus according to claim 13 wherein the pin further has therein a
15 withdrawal recess which is spaced, circumferentially relative to the pin, from the insertion recess, and which extends longitudinally relative to the pin to said second end of the pin but which terminates at a position spaced from said first end of the pin, whereby the insertion recess permits insertion of the pin via one end of said aligned passages in a first longitudinal direction of the pin when the insertion recess is aligned
20 with the first formation, and the withdrawal recess permits withdrawal of the pin in said first direction, via an opposite end of said aligned passages, when the withdrawal recess is aligned with the first formation.
15. Apparatus according to claim 14 wherein the pin is configured such that, once
25 having been inserted into the aligned passages with the insertion recess aligned with the first formation, the pin is in the free position and is rotatable to the locked position in a particular rotational direction, and once having being rotated thus to the locked position, is rotatable in said particular rotational direction to a further position in which the withdrawal recess is aligned with the first formation.

16. Apparatus according to any one of claims 5 to 15 wherein the passage of one of the components is closed at one end such that said aligned passages are closed at one end.
- 5 17. Apparatus according to claim 16 wherein the component having a passage closed at one end preferably includes a resilient element in that passage immediately adjacent the one closed end, wherein the pin, when accommodated in said aligned passages, is configured to abut against the resilient element.
- 10 18. Apparatus according to any one of claims 5 to 17 wherein the passage of one of said components includes two coaxial spaced-apart sub-passages, and the passage of the other component is disposed between, and aligned with, said sub-passages when the components are connected to each other, to form said aligned passages.
- 15 19. Apparatus according to any one of claims 5 to 18 wherein at least part of said first formation is resiliently movable under a force exerted by the pin when the pin is rotated from said free position to said locked position.
- 20 20. Apparatus according to claim 19 wherein the particular said component that includes said first formation further includes resilient means for allowing said resilient movement of said part of the first formation, while urging said part against the pin.
- 25 21. Apparatus according to claim 20 wherein said particular component includes a retaining element, the retaining element including an elastomeric support and an engagement element, wherein the support constitutes said resilient means and the engagement element includes said first formation and abuts the support.
- 30 22. Apparatus according to claim 21 wherein the support defines a channel in which the engagement element is received.
23. Apparatus according to claim 22 wherein the support and engagement element are bonded to each other.

24. Apparatus according to claim 22 or claim 23 wherein the support defines a deformation passage extending substantially parallel to said channel, to facilitate resilient deformation of the support.

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25. Apparatus according to any one of claims 21 to 24 wherein the pin includes a plurality of second formations and the engagement element is castellated so as to define a plurality of first formations, each for engaging with a respective second formation when the pin is in the locked position.

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26. Apparatus according to claim 20 wherein said particular component includes a retaining element which defines a hole having a closed end and an opposite open end, the retaining element including said resilient means within said hole and including said first formation, the first formation being movable along said hole and abutted against said resilient means, and protruding through said open end.

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27. Apparatus according to claim 26 wherein the first formation is constituted by a ball.

20 28. Apparatus according to claim 26 or claim 27 wherein the resilient means is constituted by a coil spring

29. Apparatus according to claim 26 or claim 27 wherein the resilient means is constituted by an elastomeric material.

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30. Apparatus according to any one of claims 26 to 29 wherein the retaining element includes a plurality of said holes and said first formations and the pin includes a plurality of corresponding second formations.

30 31. Apparatus according to any one of the preceding claims wherein the first and second components are machinery components, the first component being a wear-

component configured to wear in use, and the second component is configured to support the first component.

32. Apparatus according to any one of the preceding claims wherein the first
5 component and second component are components of earth moving equipment.

33. Apparatus according to claim 32 wherein the first component and second
component are a tooth and adaptor, respectively, of earth moving equipment, the
adaptor being configured to mount the tooth to an earth moving bucket.

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34. Apparatus according to claim 32 wherein the first component and second
component are a shroud and adaptor, respectively, of earth moving equipment, the
adaptor being configured to mount the shroud to an earth moving bucket.

15 35. Apparatus according to claim 32 wherein the first component is one of a tooth
and shroud, and the second component is a lip of an earth moving bucket.

36. Apparatus according to any one of the preceding claims wherein the pin
includes a non-circular formation at an end of the pin for engagement with a rotatable
20 tool to effect rotation of the pin between the free and locked positions.

37. Apparatus according to any one of the preceding claims wherein the pin,
adjacent, but spaced from, one end, has a cavity therein, and an end portion extending
from said one end to the cavity, the end portion having an aperture extending
25 therethrough and opening through said one end and opening into the cavity, the end
portion having an inner surface facing into the cavity away from said one end, the
aperture permitting the insertion of a pin-removal tool therethrough into the cavity and
withdrawal of the pin from said aligned passages by engagement of the pin-removal
tool with said inner surface.

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38. Apparatus according to claim 36 including a cap releasably engageable with
the pin at said one end.

39. A method of releasably interlocking a first component and a second component, wherein the first component defines a first passage and the second component defines a second passage, the method including the steps of:

5 connecting the first component to the second component so that the first and second passages are aligned with each other;

 inserting a pin into the aligned passages so that, when so inserted, the pin is in a free position in which it is free to be selectively withdrawn from the aligned passages;

10 rotating the pin relative to the components, from the free position to a locked position in which the pin engages at least one of the components to prevent withdrawal of the pin from the aligned passages and hence to prevent separation of the components.

15 40. The method of claim 39 wherein the step of connecting the first component to the second component includes connecting the components such that they can substantially only be separated by effecting relative movement of the components in opposite disengagement directions, and the step of inserting the pin includes inserting the pin such that, when the pin extends from the first passage into the second passage,
20 the pin prevents said relative movement in said disengagement directions.

41. Apparatus substantially as herein described with reference to Figures 1 to 14.

42. A method substantially as herein described with reference to Figures 1 to 14.
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